

Customer No.: 31561
Application No.: 10/065,632
Docket No.: 8012-US-PA

REMARKS

Present Status of Patent Application

Claims 15-20 remain pending, of which claim 15 has been amended and claim 18 has been canceled to more clearly describe the claimed invention. Support for amendments to claim 15 can be found on page 5, lines 16-20. It is believed that no new matter adds by way of these amendments made to the claims or otherwise to the application. For at least for the following reasons, Applicant respectfully submits that claims 15-17 and 19-20 patently define over the prior art of record. Reconsideration is respectfully requested.

Discussion of Rejections under 35 USC§ 103

- 1. The Office Action previously rejected claims 15-17 under 35 U.S.C. 103(a), as being unpatentable over Kwon et al. (US-2002/0017711, hereinafter Kwon) in view of Akram et al. (US2003/0067073, hereinafter Akram).*
- 2. The Office Action previously rejected claims 18-20 under 35 U.S.C. 103(a), as being unpatentable over Kwon and Akram as applied to claims 15-17 above, and in further view of Hwan et al. (US-2002/0180064, hereinafter Hwan).*

In rejecting the above claims, the Office Action relied upon Akram to disclose forming solder bump by electroless plating. The Office Action recognized that both Kwon and Akram fail to disclose a method of forming a photoresist layer having at least an opening that exposes the bonding pad and removing the photoresist layer. However, the Office Action relied upon Hwan to disclose these steps.

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Applicant respectfully disagrees and traverses the above rejections as set forth below. Independent claim 15, as amended, is allowable for at least the reason that Kwon, Akram and Hwan failed to teach, suggest or disclose each and every feature of the claimed invention.

However, Kwon teaches forming multi-layered UBM layer 108 and then forming the metal bump 110 directly on the UBM layer 108 (Figs. 7, 9-13). Akram merely discloses, after forming the UBM structure of three metal layers 70/72/74, a solder bump 80 is formed on the UBM pad 70/72/74 by known industry methods including electroless plating. As recognized by the Office Action, Kwon at least fails to disclose forming the bump by electroless plating. However, even the combination of Kwon and Akram fails to teach, suggest or disclose at least the steps of "performing an electroless plating process for forming a conductive layer within the opening of the photoresist layer, so that at least a bump body is formed inside the opening and directly in contact with the medium layer; and removing the photoresist layer" as recited in the amended claim 15. Accordingly, Applicant respectfully submits that Kwon and Akram cannot possibly arrive at the claimed invention in this regard.

Similarly, as shown in Kwan's Figs. 1b-1c, after forming the UBM layer 26 including an adhesion layer 30 and a wetting layer 28, a photoresist layer is deposited on the UBM layer and the metal solder bump 40 is deposited on the UBM layer.

Hwan fails to remedy the deficiencies of Kwon and Akram, because Hwan does not disclose the lacking features of Kwon and Akram. None of these references teach or suggest forming a medium layer on the bonding pad and forming a bump body in direct

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contact with the medium layer. Instead, all these three references teach forming the multi-layered UBM layer by using complex fabrication processes. In fact, because Kwon, Akram and Hwan teach forming the UBM layer before forming the bump, all these references obviously fail to recognize the advantages of avoiding the complex process steps of forming the UBM layer by forming the bump body in direct contact with the medium layer that is directly on the bump pad.

According to the present invention, the medium layer is formed directly on the bonding pad and the bump body is directly in contact with the medium layer, thus substantially simplifying the fabrication processes of forming the solder bump and reducing the overall fabrication cost. Applicant would like to point out that the novelty is not merely to show a step of forming a conductive layer in the opening of the photoresist layer to form a medium layer directly on the bump pad but rather to show how to simplify the process of forming the solder bump by significantly reducing the number of complex process steps such as avoiding the steps of forming a standard UBM layer before forming the solder bump.

For at least the foregoing reasons, Applicant respectfully submits claims 15-17 and 19-20 patently define over Kwon, Akram and Hwan, and therefore should be allowed. Reconsideration and withdrawal of these rejections is respectfully requested.

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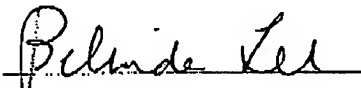
CONCLUSION

For at least the foregoing reasons, it is believed that all pending claims 15-17 and 19-20 are in proper condition for allowance. If the Examiner believes that a conference would be of value in expediting the prosecution of this application, he is cordially invited to telephone the undersigned counsel to arrange for such a conference.

Respectfully submitted

Date :

April 14, 2004


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